

CHAPTER 2. PROPORTIONATE MORTALITY RATIOS: NATIONAL OCCUPATIONAL MORTALITY SURVEILLANCE DATA

This chapter presents proportionate mortality ratios (PMRs) derived from death certificate data in the National Occupational Mortality Surveillance (NOMS) database for the years 1986 through 1993. At the time this report was prepared, 1993 was the latest year for which data were available. Industry is classified under the 1980 U.S. Bureau of the Census classification system [Bureau of the Census 1982]; cause of death, under the International Classification of Diseases, Ninth Revision (ICD-9) [World Health Organization 1977].

A PMR of 100 indicates a mortality risk for a particular industry group that is similar to that for all industry groups combined. A PMR over 100 suggests a higher risk; a PMR under 100 suggests a lower risk. PMRs are subject to many factors that affect their reliability and validity and may not be comparable across populations with very different causes of death. An elevated PMR for a specified cause of death among an occupational or industry group *may* indicate a relationship between a work exposure and the cause of death specified. However, there are many limitations of PMRs as a measure of risk; they are most useful for generating hypotheses about exposure-disease relationships, which can then be tested in other studies.

Selected PMRs are presented separately for males and females for coal mining, metal mining, nonmetallic mineral mining and quarrying (which includes nonmetal, stone, and sand and gravel), and for oil and gas extraction. All PMRs have been adjusted for age and race. In general, PMRs are presented

only if the lower 95% confidence limit exceeded 100. If a PMR in an ICD-9 subcategory was above 100, however, the PMR for the larger category into which the subcategory falls is always presented and may be less than 100.

PMRs can be expected to be elevated for conditions that have a high prevalence in particular occupational groups. PMRs showed elevated values for conditions known to affect miners, such as coal workers' pneumoconiosis, pneumoconiosis due to silica, tuberculosis, chronic pulmonary heart disease, and injuries. Additional findings of interest were—

- An elevated PMR for myocardial infarction among male coal miners (table 2-1);
- Elevated PMRs for neurologic disease in general and anterior horn cell disease, in particular among male metal miners (table 2-3);
- An elevated PMR for rheumatic heart disease in male metal miners (table 2-3);
- Elevated PMRs for malignant neoplasms of the digestive organs and peritoneum and for malignant neoplasms of the colon and rectum in female nonmetal miners (table 2-6); and
- Elevated PMRs for non-A, non-B hepatitis and arteriosclerotic heart disease among male oil and gas workers (table 2-7).

Table 2-1.—Male workers age 18 and older with usual industry on death certificate listed as coal mining, selected States: proportionate mortality ratios and 95% confidence intervals for selected ICD classified causes of death, 1986-1993; adjusted for age and race. Total deaths = 46,451

| Cause of death (ICD-9 code) | No. | PMR | 95% CI |
|---|--------|-------|--------------|
| Infectious and parasitic diseases (001-139) | 575 | 74 | 68, 80 |
| Tuberculosis (010-018, 137) | 73 | 204 | 160, 256 |
| Pulmonary tuberculosis (011) | 62 | 233 | 179, 299 |
| | | | |
| Malignant neoplasms (140-208) | 10,205 | 90 | 88, 91 |
| Malignant neoplasm, trachea, bronchus, and lung (162) | 4,173 | 108 | 105, 111 |
| | | | |
| Diseases of the heart (390-398, 402, 404-429) | 16,848 | 98 | 97, 99 |
| Ischemic heart disease (410-414) | 11,856 | 97 | 96, 99 |
| Acute myocardial infarction (410) | 6,621 | 103 | 101, 105 |
| Other ischemic heart disease (411-414) | 5,235 | 91 | 88, 93 |
| | | | |
| Diseases of the respiratory system (460-519) | 8,771 | 175 | 172, 177 |
| Chronic obstructive pulmonary disease (490-496) | 3,335 | 128 | 125, 132 |
| Coal workers' pneumoconiosis (500) | 3,145 | 3,743 | 3,722, 3,764 |
| Pneumoconiosis due to silica (502) | 49 | 513 | 380, 679 |
| Other and unspecified pneumoconiosis (503-505) | 151 | 1,686 | 1,428, 1,977 |
| | | | |
| External causes of injury and poisoning (E800-E999) | 2,279 | 108 | 104, 112 |

Source: National Occupational Mortality Surveillance (NOMS) database.

Table 2-2.—Female workers age 18 and older with usual industry on death certificate listed as coal mining, selected States: proportionate mortality ratios and 95% confidence intervals for selected ICD classified causes of death, 1986-1993; adjusted for age and race. Total deaths = 387

| Cause of death (ICD-9 code) | No. | PMR | 95% CI |
|---|-----|--------|---------------|
| Malignant neoplasms (140-208) | 79 | 91 | 72, 114 |
| Malignant neoplasm connective and other soft tissue (171) | 3 | 521 | 107, 1522 |
| | | | |
| Diseases of the respiratory system (460-519) | 40 | 117 | 84, 159 |
| Coal workers' pneumoconiosis (500) | 2 | 73,000 | 8,839, >9,999 |
| Other and unspecified pneumoconiosis (503-505) | 1 | 22,000 | 540, >9,999 |
| | | | |
| External causes of injury and poisoning (E800-E999) | 24 | 182 | 117, 271 |

Source: National Occupational Mortality Surveillance (NOMS) database.

Table 2-3.—Male workers age 18 and older with usual industry on death certificate listed as metal mining, selected States: proportionate mortality ratios and 95% confidence intervals for selected ICD classified causes of death, 1986-1993; adjusted for age and race. Total deaths = 5,542

| Cause of death (ICD-9 code) | No. | PMR | 95% CI |
|---|-------|-------|--------------|
| Infectious and parasitic diseases (001-139) | 67 | 65 | 51, 83 |
| Tuberculosis (010-018, 137) | 12 | 271 | 140, 173 |
| | | | |
| Diseases of the nervous system and sense organs (320-389) | 116 | 120 | 99, 144 |
| Anterior horn cell disease (335) | 19 | 180 | 108, 280 |
| | | | |
| Diseases of the heart (390-398, 402, 404-429) | 1,733 | 86 | 83, 90 |
| Rheumatic fever and rheumatic heart disease (390-398) | 19 | 182 | 110, 284 |
| Other forms of heart disease, including diseases of pulmonary circulation (415-429) | 574 | 110 | 101, 119 |
| | | | |
| Diseases of the respiratory system (460-519) | 784 | 141 | 131, 151 |
| Pneumonia and influenza (480-487) | 223 | 122 | 107, 139 |
| Chronic obstructive pulmonary disease (490-496) | 423 | 144 | 131, 158 |
| Pneumoconiosis due to silica (502) | 37 | 3,575 | 2,517, 4,928 |
| Other and unspecified pneumoconiosis (503-505) | 6 | 598 | 220, 1302 |
| | | | |
| External causes of injury and poisoning (E800-E999) | 472 | 137 | 125, 150 |

Source: National Occupational Mortality Surveillance (NOMS) database.

Table 2-4.—Female workers age 18 and older with usual industry on death certificate listed as metal mining, selected States: proportionate mortality ratios and 95% confidence intervals for selected ICD classified causes of death, 1986-1993; adjusted for age and race. Total deaths = 189

| Cause of death (ICD-9 code) | No. | PMR | 95% CI |
|---|-----|-----|----------|
| Diseases of the respiratory system (460-519) | 24 | 156 | 100, 232 |
| | | | |
| External causes of injury and poisoning (E800-E999) | 19 | 147 | 89, 230 |

Source: National Occupational Mortality Surveillance (NOMS) database.

Table 2-5.—Male workers age 18 and older with usual industry on death certificate listed as nonmetallic mining and quarrying, selected States: proportionate mortality ratios and 95% confidence intervals for selected ICD classified causes of death, 1986-1993; adjusted for age and race. Total deaths = 5,384

| Cause of death (ICD-9 code) | No. | PMR | 95% CI |
|--|-------|-------|--------------|
| Infectious and parasitic diseases (001-139) | 69 | 66 | 51, 83 |
| Tuberculosis (010-018, 137) | 9 | 202 | 92, 383 |
| Pulmonary tuberculosis (011) | 8 | 242 | 105, 478 |
| | | | |
| Malignant neoplasms (140-208) | 1,306 | 96 | 92, 101 |
| Malignant neoplasm of respiratory and intrathoracic organs (160-165) | 525 | 110 | 101, 120 |
| | | | |
| Diseases of the heart (390-398, 402, 404-429) | 1,884 | 98 | 95, 102 |
| Chronic pulmonary heart disease (416) | 11 | 238 | 119, 426 |
| | | | |
| Diseases of the respiratory system (460-519) | 643 | 122 | 113, 132 |
| Chronic obstructive pulmonary disease (490-496) | 372 | 134 | 121, 148 |
| Pneumoconiosis due to silica (502) | 24 | 2,318 | 1,485, 3,450 |
| | | | |
| External causes of injury and poisoning (E800-E999) | 393 | 116 | 105, 128 |

Source: National Occupational Mortality Surveillance (NOMS) database.

Table 2-6.—Female workers age 18 and older with usual industry on death certificate listed as nonmetallic mining and quarrying, selected States: proportionate mortality ratios and 95% confidence intervals for selected ICD classified causes of death, 1986-1993; adjusted for age and race. Total deaths = 185

| Cause of death (ICD-9 code) | No. | PMR | 95% CI |
|--|-----|-----|----------|
| Malignant neoplasms (140-208) | 50 | 111 | 83, 147 |
| Malignant neoplasm, digestive organs, and peritoneum (150-159) | 19 | 182 | 109, 283 |
| Malignant neoplasm, colon (153) | 13 | 275 | 146, 470 |
| | | | |
| External causes of injury and poisoning (E800-E999) | 15 | 205 | 115, 337 |

Source: National Occupational Mortality Surveillance (NOMS) database.

Table 2-7.—Male workers age 18 and older with usual industry on death certificate listed as petroleum and natural gas extraction, selected States: proportionate mortality ratios and 95% confidence intervals for ICD classified causes of death; adjusted for age and race. Total deaths = 13,840

| Cause of death (ICD-9 code) | No. | PMR | 95% CI |
|---|-------|-----|----------|
| Infectious and parasitic diseases (001-139) | 186 | 66 | 57, 76 |
| Non-A, non-B viral hepatitis (0704-0709) | 10 | 277 | 133, 509 |
| | | | |
| Malignant neoplasms (140-208) | 3,331 | 100 | 97, 103 |
| Malignant neoplasm, trachea, bronchus, and lung (162) | 1,242 | 109 | 104, 115 |
| | | | |
| Diseases of the heart (390-398, 402, 404-429) | 5,038 | 102 | 100, 104 |
| Ischemic heart disease (410-414) | 3,635 | 103 | 101, 106 |
| Acute myocardial infarction (410) | 1,954 | 104 | 100, 108 |
| Other ischemic heart disease (411-414) | 1,681 | 102 | 98, 107 |
| | | | |
| External causes of injury and poisoning (E8000-E999) | 1,225 | 119 | 115, 124 |

Source: National Occupational Mortality Surveillance (NOMS) database.

Table 2-8.—Female workers age 18 and older with usual industry on death certificate listed as petroleum and natural gas extraction, selected States: proportionate mortality ratios and 95% confidence intervals for ICD classified causes of death; adjusted for age and race. Total deaths = 806

| Cause of death (ICD-9 code) | No. | PMR | 95% CI |
|---|-----|-----|---------|
| Malignant neoplasms (140-208) | 238 | 109 | 96, 124 |
| | | | |
| External causes of injury and poisoning (E800-E999) | 47 | 121 | 89, 161 |

Source: National Occupational Mortality Surveillance (NOMS) database.